

Biodiesel at the Intersection

Processors cope with high feedstock prices; eye impact of renewable diesel on market

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Biodiesel has experienced more than its share of growing pains as it moves from infancy as an alternative fuel toward becoming a well-established, viable renewable fuel. Producers endured a very trying year in 2007. Hopefully, with these ups and downs has come invaluable experience, but there are reasons to expect that the market turbulence isn't quite over.

Market rocked by oilseed prices

High feedstock costs were far and away the most destabilizing factor faced

by biodiesel producers this past year. Soybean biodiesel feedstocks rose steadily and prices increased sharply throughout the year.

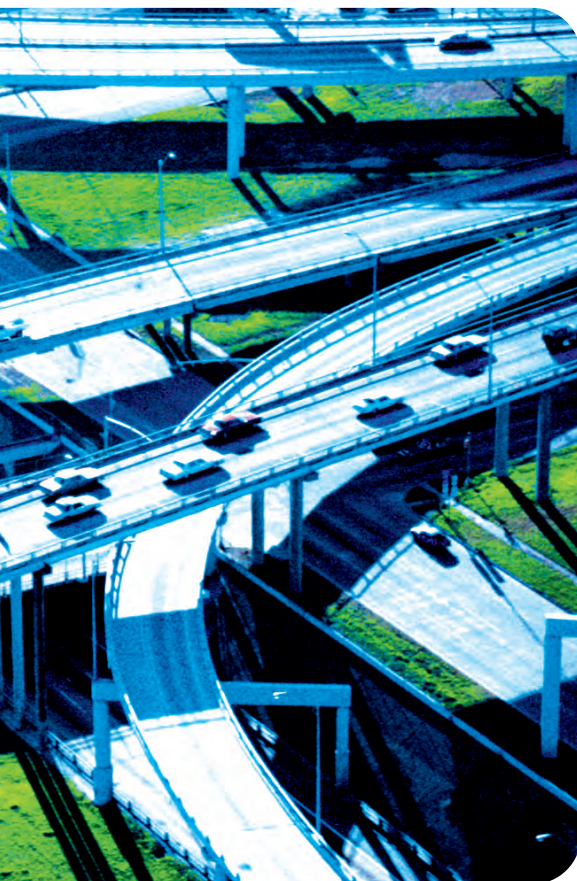
It is hard to imagine now, but not long ago soy oil was less than 20 cents per pound. But from February of 2005 to December 2007, soy oil prices jumped 160 percent, from 18 cents to 47 cents per pound. As of this writing (in late March), soy oil futures continue to exceed historically high values at 55 cents per pound, while soybeans have pushed through a 35-year-old record of \$12.50 per bushel.

"Beans in the teens" is hardly wishful thinking for soybean growers anymore; it's simply a fact of life. And while higher feedstock prices were anticipated, the sheer magnitude caught almost everyone off guard. The impacts

of higher energy costs worked their way through the economy and were especially detrimental to the agriculture and transportation sectors. But a "perfect storm" of increased corn demand, significantly fewer soybean acres in production and a growing demand for biodiesel feedstock pushed soy oil prices to dizzying heights.

Processors struggle with high prices

For many biodiesel producers, the economic pressure was too great to withstand. A dozen plants reportedly filed for bankruptcy in 2007, and others are for sale (see article about Great River Soy on page 27). According to the most recent information provided by the National Biodiesel Board, there are 172 U.S. plants operating, with 2.21



Soybean prices increased to \$12.50 per bushel in late March. USDA photo

billion gallons of production capacity. But industry and USDA estimates concur that only 450 million gallons were produced in 2007.

In other words, about 80 percent of the nation's biodiesel production capacity is sitting idle. Many plants, while not shuttered, produce fuel solely on a "per order" basis.

Although this meant desperate circumstances for many last year, the situation turned out to be a boon for biodiesel producer-exporters. As the dollar continued its slide throughout 2007, trading at a 15-year low, it simultaneously pushed crude oil prices and U.S. biodiesel exports to an all-time high.

After taking full advantage of the biodiesel Blenders Credit, about 80 percent of U.S.-produced biodiesel is

exported, largely to the European Union (EU). Even though the EU has stepped up its protests against U.S. subsidies for biodiesel exports, Congress — in lieu of repealing the law that permits exported biodiesel to receive the Blenders Credit — seems likely to allow the credit to sunset this December, according to many market watchers. And even those who believe that the credit may be extended, recognize that modifications are necessary to address a number of areas in the program.

The Blenders Credit expiration seems to be the price the industry paid in advance to receive a biodiesel-specific (or methyl-ester) renewable fuel standard (RFS) in the Energy Independence and Security Act of 2007 (HR 6), signed in December. But while

an RFS was warmly received by the industry, the requirement of 500 million gallons of biodiesel to be blended into the nation's fuel supply in 2009 (expanding to 1 billion gallons per year in 2012) is viewed by many in the industry as too-little, too-late.

Making market inroads

Industry insiders have long held that an RFS would be required for biodiesel to make inroads into the U.S. commercial transportation-fuel market. Finding markets for biodiesel has become a challenge even during the best of times. Biodiesel is chosen for a variety of reasons: regulatory compliance (for air quality and renewable fuels standards), patriotic and energy security reasons. However, it may still be a while before biodiesel is chosen because it's the best available product in a competitive marketplace.

In the meantime, the industry continues to hope that the heating oil and other stationary fuel markets will begin to recognize what a good fit biodiesel can be. Nevertheless, if biodiesel is to find acceptance as a commercial transportation fuel, it will have to compete on price and quality with petroleum diesel. In addition to being sold at a competitive price, biodiesel must have cold-weather flow, comparable energy content, reasonable fuel-filter-maintenance requirements, etc. After all, truck drivers don't have to contend with these issues with regular diesel fuel. Why, then, should they deal with these issues to use biodiesel? Truck drivers' operating margins are as thin as those in any other service industry. Even a penny a gallon is a big deal, and enough to make or change fuel purchasing decisions.

Renewable diesel

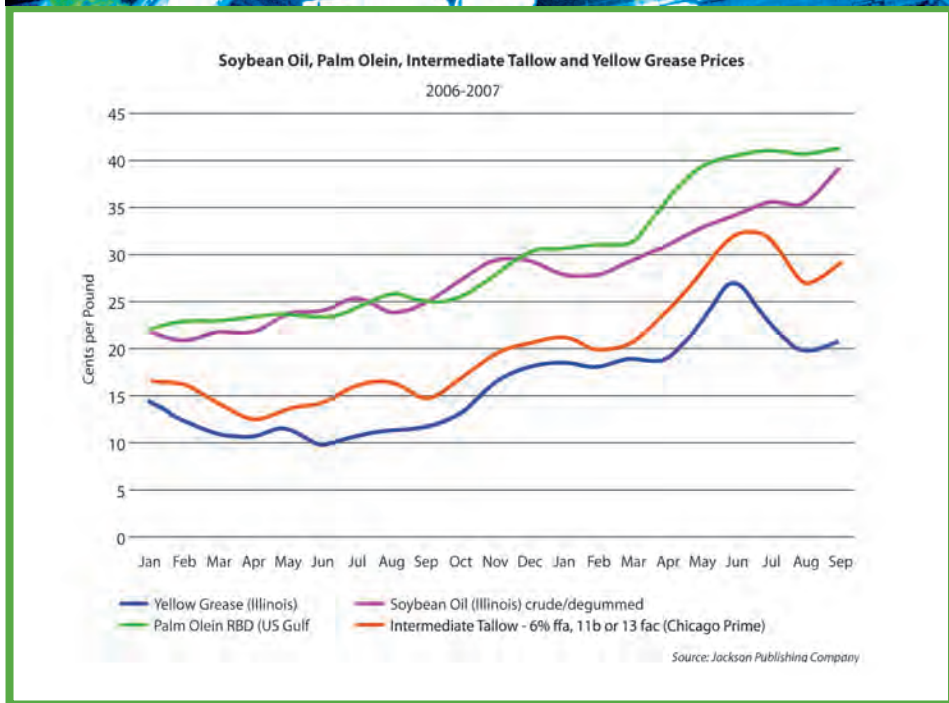
But if biodiesel producers aren't already facing enough difficulty, the emergence of "renewable" diesel is expected to create decidedly more industry turbulence. Renewable diesel is

a broad class of fuels derived from biomass feedstocks, including oils or animal fats, processed through petrochemical processes.

The most advanced of these petroleum refinery processes are called hydrotreating and thermal depolymerization (TDP). These processes use vegetable oils or animal fats solely or co-processed with petroleum distillate fractions (diesel fuel) to produce a hydrocarbon mixture that satisfies the standard for petroleum diesel fuel (ASTM D975).

Consequently, renewable diesel may use the existing petroleum infrastructure for blending and transporting (in particular, the nation's pipeline system).

The technology for producing renewable diesel fuel from soybean oil



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was developed by ConocoPhillips and tested in 2006 at its refinery in Whitegate, Ireland. But other manufacturers (including Neste Oil) have also announced their intent to commercialize similar technologies and expect to produce renewable diesel in the United States either late this year or in 2009.

This development was widely encouraged in the spring of 2006 by a broad interpretation by the Internal Revenue Service to include co-processed, or “green,” diesel and Fischer Tropsch-style distillates synthesized from biomass as qualifying for the Blenders’ Credit.

On the heels of the IRS ruling, ConocoPhillips and Tyson Foods announced a partnership to use fat from Tyson’s rendering plants to produce up to 175 million gallons a year of renewable diesel that meets all federal

standards for ultra-low-sulfur diesel. Production began late last year and is expected to ramp up through 2009. The total bio-refining capacity under construction for fuels made from animal fat is now above 250 million gallons per year.

Attractive economics

Renewable diesel production offers some very attractive economics, given a present breakeven price of \$4.50 per gallon for biodiesel (when \$1 per gallon is subtracted for the Blenders Credit) and a feedstock price of 55 cents per pound of soybean oil. At 28 cents per pound for Tyson’s poultry, hog or beef fat — plus conversion costs which range from 5 to 10 cents a pound, transportation costs of about 5 cents per pound and capital investment/depreciation of from 6 to 13 cents a pound — renewable diesel breakeven costs of \$3.12 per

gallon appear quite attractive against the current low sulfur diesel price in Houston of \$2.92 per gallon (after the Blenders Credit).

The National Biodiesel Board’s response is one of understandable concern:

“In a time of budget deficits and rising fuel prices — due in large part to limited domestic refining capacity — biodiesel producers question the wisdom of directing tax revenue to subsidize existing oil refining operations. One of the most significant factors behind rising fuel prices is the constraint on refining capacity in the United States. Biodiesel producers contribute doubly to our nation’s energy independence by producing fuel and building refining capacity.

“In sharp contrast, co-processed renewable diesel uses existing refining capacity to displace limited amounts of imported petroleum with a domestic bio-oil. Because the supply of available feedstock — animal fat and vegetable oils — is essentially fixed, the Blender’s Credit to integrated oil companies engaged in co-processing serves to push feedstock prices even higher than their already unprecedented levels.

“Substantial economic benefits are

CHS, AGP weigh multiple factors for feedstock choices

AGP is the largest cooperative soybean processor in the world, as well as the largest soybean processor in Iowa and the fourth largest soybean processor in the United States, based on capacity. AGP began refining soybean oil in 1985, and in 1997 began soybean methyl ester production at Sergeant Bluff, Iowa. AGP markets soy methyl-ester products under the SOYGOLD brand in a variety of applications, including biodiesel fuel. In the fall of 2007, AGP began operations in a newly constructed methyl ester plant in St. Joseph, Mo.

John Campbell, AGP's senior vice president of industrial products and government relations, says that this federated co-op "does not believe that renewable diesel producers will have any significant advantage over traditional biodiesel producers using the same feedstock, especially when their downstream and upstream opportunity costs are considered. Refiners do not use existing refineries to make renewable diesel, as is widely believed."

For an integrated oil company, such a decision is far more complex than a single refinery "go" or "no-go" decision. Such a commitment involves substantially large investments and the studied calculation that it's significantly more profitable to process biomass feedstock than petroleum, Campbell says.

CHS Inc. is also following the renewable diesel issue very closely because its food, energy and renewable energy businesses are directly impacted by the debate.

CHS has refined petroleum for 75 years in Montana and Kansas and distributes fuel to more than 20 states. The cooperative has extensive assets involved with oilseed crushing and production of oilseed-based sauces and dressings. It has also been involved in biofuel blending and distribution, including biodiesel, for 30 years and in ethanol production for two years.

Bob Looney of CHS Federal Affairs Office, provided the following summary of CHS' viewpoint on renewable diesel.

"Since the establishment of the renewable diesel \$1 tax break in the 2005 Energy Policy Act, CHS has looked at the investment costs, the quality, security and dependability of consistent feedstock (fats and oilseeds), and other factors to decide whether to invest in renewable diesel. CHS looks at renewable diesel from several perspectives:

(1) **Economics** — CHS invests in activities that make sense economically and believes that the \$1 Blender's Credit can help firm up that condition and possibility. We also looked at the 50 cent credit from the Highway Bill but believe it is insufficient.

(2) **Quality** — Fuel industry experts have suggested that renewable diesel (RD) has better qualities than biodiesel. One of those is quality consistency; another is cold weather storage and distribution, which biodiesel does not have. We have worked with this issue in Minnesota and Montana. It adds costs to biodiesel. Because of economics and quality, CHS has no plans to go into making methyl esters to make biodiesel. We will, however, continue to blend methyl esters to make a low percentage biodiesel (our blends range from 0.5 percent to 2 percent) in some of our trade territory. CHS recently constructed a biodiesel blending facility in Colorado.

(3) **Competing demands** — Another issue is sometimes part of the "food vs. fuel debate" — our oilseed experts see a limit to biodiesel's pull on oilseed stock before it creates another stress on oilseed prices.

(4) **Politics** — CHS is sensitive to our various partners' needs. As we started to look closely at renewable diesel, the National Biodiesel Board (NBB), of which CHS is a supporter, felt the tax break was too generous for petroleum companies and posed a threat to their members, and so decided to fight to limit the eligibility. CHS worked with NBB, the American Soybean Association (ASA), and others to seek a political compromise." ■

associated with domestic biodiesel production: an estimated 39,102 jobs and \$24 billion are expected to be added to the economy between now and 2015. The economic, environmental and rural development benefits associated with biodiesel production may very well be lost if the tax incentive is directed to support existing oil refinery operations."

Congress, NBB adopt similar stances

In 2007, the U.S. House of Representatives introduced a bill to clarify that co-processed renewable diesel does not qualify for the \$1 per gallon tax credit. A report issued to accompany the (then proposed) 2007 Energy Bill noted the Committee's stance that tax incentives for renewable

diesel should encourage the building of new plants and provide new refining capacity for renewable diesel, but are not intended to subsidize decades' old refinery capacity in a way that contributes neither to investment in production capacity nor fuel.

Although HR 2776 passed the House last August, substantial portions of it were folded into the omnibus energy

bill that became the Energy Independence and Security Act of 2007 (HR 6), signed into law in December with all renewable diesel provisions removed from the bill prior to cloture.

The bigger picture: the nexus of agriculture and energy

However layered and complex the implications of renewable diesel development may seem for the biofuels industry, consolidation and realignment of the sector seem less likely a result of this innovative new technology than from a massive over-investment in production capacity, relative to the available feedstock. Once capacity exceeds what can be economically processed, given a fixed amount of

feedstock, it doesn't really matter what type of plant or technology is employed. Feedstocks are far and away the most significant factor of production.

What may have also been lost amid the controversy is that a fundamental shift in commodity pricing occurred in 2007 as all globally traded fats and oils (lipids) converged with world crude oil prices. Figure 1 illustrates the price movements of the principal biodiesel feedstocks. Note their steadily upward and closely correlated movement throughout 2006 and into the first quarter of 2008.

The nexus between agriculture and energy is even more evident, however, when world lipid prices are correlated

with crude oil prices, as illustrated in Figure 2 (published in January 2008 *Biodiesel* magazine, "NBB In Sight — Guns, butter and biodiesel," by Joe Jobe, CEO of the National Biodiesel Board, and originally in the Nov. 7 issue of *Kingsman Biodiesel Weekly*).

In 2007, global vegetable oil markets began moving in tandem with crude oil. What's even more noteworthy is that prices converged even as U.S. fats and oil inventories grew. This remarkable shift makes clear that agricultural lipids are now globally traded as energy commodities.

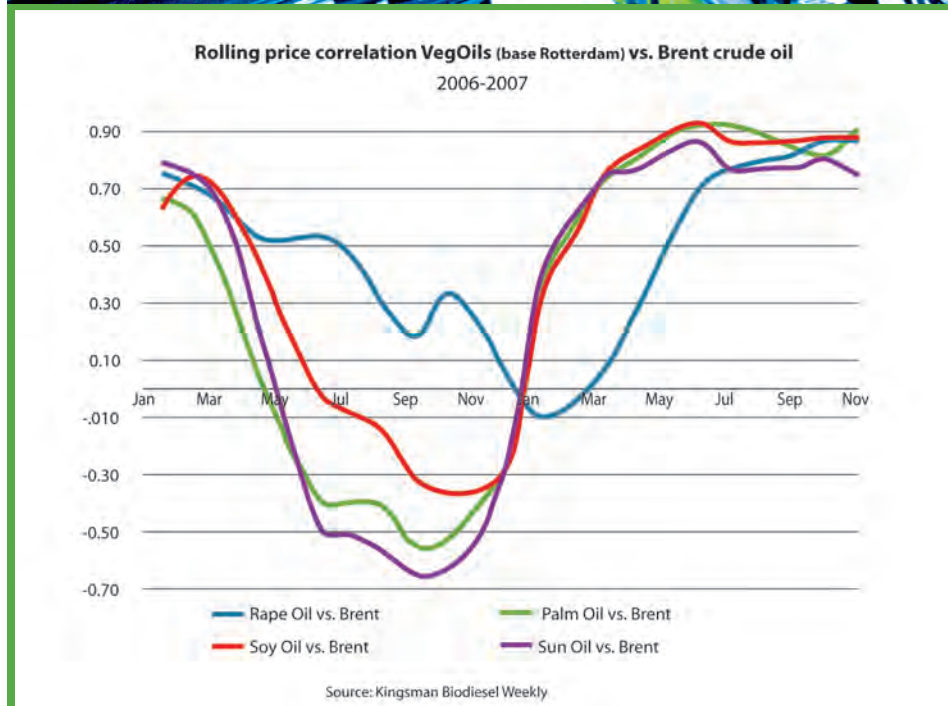
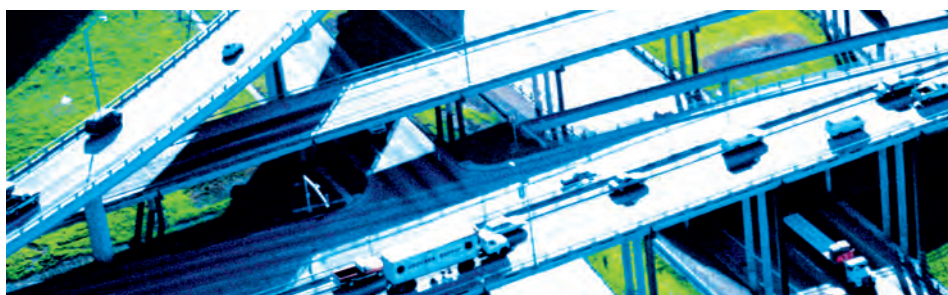
What's also clear is that current commodity prices are signaling agriculture to increase lipid production, significantly and quickly, in recognition that expected global supply will be insufficient to meet tomorrow's energy demands. Seemingly, most of agriculture is now in the "oil business," either directly or by default, and should plan accordingly.

How long will it be before refineries compete directly with biodiesel producers for available lipid molecules? The methyl-ester-specific RFS and the likely allowed sun-setting of the Blenders Credit are less than subtle Congressional suggestions that dependence on government subsidies is no longer a sustainable business model.

Growers and feedstock providers are the clear winners in the near term. And if we remember that the first among many motivations for a biodiesel industry was to create a demand mechanism to raise commodity prices, we can applaud the wildly successful effort. On the other hand, as all commodity prices revert to their long-term means, prudent growers and feedstock providers would do well to prepare for harder times of their own.

Some expect to see a return to fencerow-to-fencerow plantings, even as land values and rental rates ratchet ever higher and commodity markets endure considerably greater volatility.

Others have speculated that farmland values and asset valuation could be heading for a major correction. ■



Rolling price correlations reflect the degree of linear relationship between two variables; the measure ranges from +1 to -1. A correlation of +1 means that there is a perfect positive linear relationship between the two variables; -1 is a perfectly negative linear relationship, and a correlation of 0 means there is no linear relationship between them.